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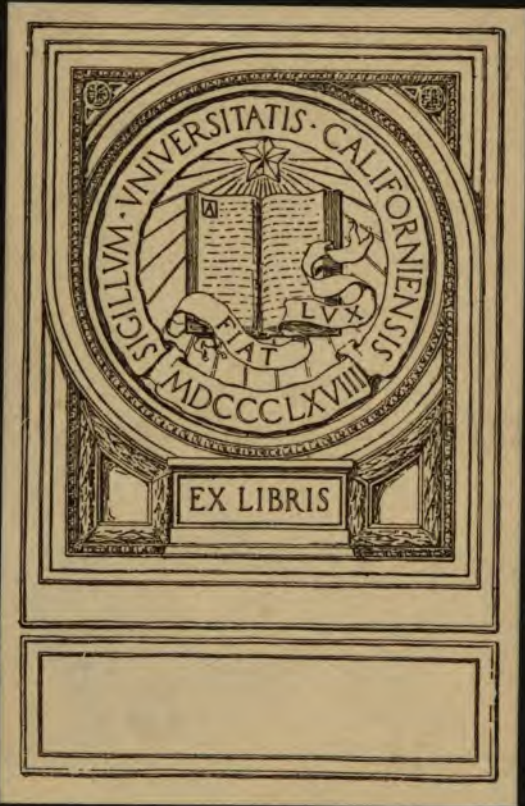
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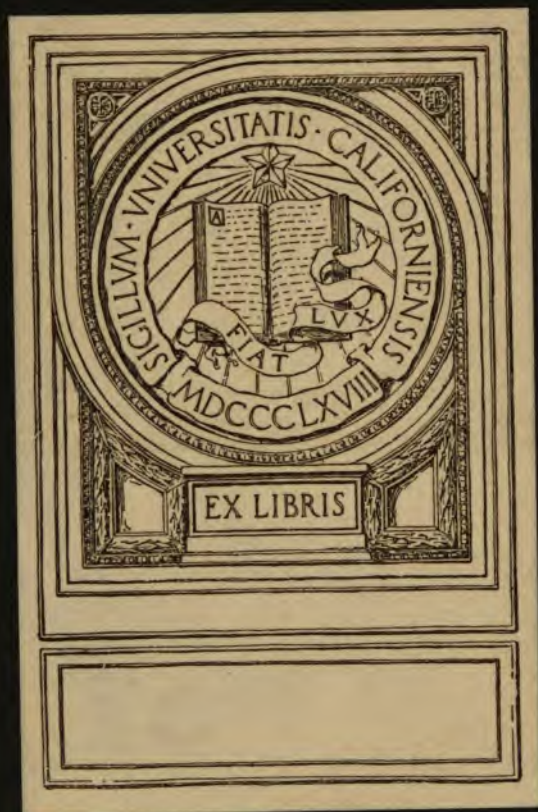
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REPORT ON THE
WATERWAY BETWEEN THE
BALTIC AND BLACK SEA.

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TO VINU
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GENERAL

Report on the Waterway between the Baltic and Black Sea

By Mr. CONSUL WOODHOUSE.

(Received at Foreign Office, June 6, 1900.)

Some time ago a number of articles appeared in different newspapers and journals on the subject of inland navigation in Russia, and, with a view to bringing into greater service the principal waterways of the Empire, a variety of suggestions were brought forward, amongst which was the gigantic idea of converting the Duna and Dnieper into a deep-water canal from the Baltic to the Black Sea.

As this latter project has attracted considerable attention, I have ventured to gather a few facts concerning the character of the rivers here mentioned, the measures that have been taken to improve their navigation, and the possibility of carrying into effect a scheme of such magnitude as that referred to.

More than a century ago the Duna was connected by a series of canals with the Berezina, one of the tributaries of the Dnieper, and produce from the central provinces of Russia, found its way to Riga by this route. But, with the introduction of railways, water transport gradually died out, and everything, with the exception of timber, is now carried by rail.

From time to time efforts have been made to induce the Ministry of Ways and Communications to improve the condition of this waterway, and to render it more available for the transport of timber, if for nothing else, but beyond granting small sums of money for the purpose of putting the locks into repair, nothing has been done.

As far back as the early forties, the urgency for improving the navigation of the rivers and canals was strongly represented to the Imperial Government, and a few years latter attempts were made to obtain concessions for private companies, who were prepared to undertake the much-needed work, the Government, apparently, being disinclined to do so, but for some reason or other all negotiations fell through, notwithstanding the fact that at that period Riga depended entirely upon the rivers for its supplies from the interior. In 1857 a company, with a capital of 500,000 r., proposed to make the Duna navigable for small steamers, provided the Government granted them a concession for 20 years, but this scheme followed the others.

In 1875 and 1876 a committee, composed of the leading members of the Riga Exchange Committee, river inspectors, engineers, merchants, and others, went into the question in detail, a survey of the course of the Duna and Berezina connections having been made for the purpose, and every argument was adduced in support of a petition to the Imperial Government for assistance in removing some of the principal obstructions in the rivers, but all to no purpose. In 1884 the matter was again brought up, and further surveys having been made, the Ministry of Ways and Communications was once more approached on the subject, and at repeated intervals since the Riga Exchange Committee, conjointly with other Exchange committees in the interior, has endeavoured to prevail upon the Government to take steps towards effecting some improvements in the rivers, and a few years ago the advantages of an efficient waterway between the Baltic and the Black Sea were pointed out. It was then shown that, with a minimum depth of water in the rivers and canals of from 4 to 5 feet, not only would produce from the interior be more easily obtained, but that it would be even possible for the industries in the north to procure coal, iron, and other articles from the southern provinces. This it was that suggested the idea of making a canal for vessels of deep draught, even for ships of war, and so practicable was the scheme made to appear that the foreign newspapers lost no time in spreading the report that the work had been decided upon, they even went so far as to give the estimated cost of the canal, viz., 200,000,000 r. (roughly, 20,000,000*l.*), to state that it would be lighted from end to end by electricity, &c., &c. Now, whether any such scheme had at that time been seriously contemplated, or any estimate of the cost worked out, I am not prepared to say, but not many weeks ago a gentleman paid a visit to Riga and laid before the Exchange Committee a project which he stated had been prepared by a syndicate of British capitalists, whom he represented. This project provided for a depth of 28 feet from sea to sea, and suggested the possibility of making inland ports for foreign vessels in the very heart of Russia, &c., at an estimated cost of 600,000,000 fr. (24,000,000*l.*), which amount would be raised by the syndicate on certain conditions, into the particulars of which it is not here necessary to go. When the Exchange Committee were requested to support the scheme they positively refused to have anything to do with it in its present form, but stated that if a depth of 10 or 11 feet could be guaranteed for the same amount, they might be inclined to give the matter consideration.

Now, as to the possibility of making a canal of a depth of 28 feet from the Baltic to the Black Sea a distance of 1,410 miles, anyone only slightly acquainted with the character of the Duna and the Dnieper might be inclined to believe that it might be done, and possibly it might, but at what cost? and how about its maintenance afterwards? Let us go over the whole course, taking first the Duna, then the Berizina connections and the Dnieper.

From Riga along the Duna to Ulla is a distance of 311 miles.

This part of the river is full of sandbanks and rocky shallows, with heavy falls of water here and there. From the surveys made by the engineer of the Riga Exchange Committee it appears that from Witebsk to Riga there is a fall of 58·93 fathoms (353·58 feet), of which the following are the details:—

	Distance.	Fall.
	Versts.	Fathoms.
From Witebsk to Ulla	92	5·69
„ Ulla to 4 versts above Disna	86	3·54
„ 4 versts above Disna to 3 versts below	7	1·55
„ 3 versts below Disna to Pereres	124	6·64
„ Pereres to Krivez	2	0·70
„ Krivez to Menkenhof	81	2·16
„ Menkenhof to Jacobstadt	23	2·94
„ Jacobstadt to Selkenhof	5	2·96
„ Selkenhof to Wener	8	0·38
„ Wener to Sedelneek-Krug	18	11·30
„ Sedelneek-Krug to Krasnije Stanki.. ..	64	12·56
„ Krasnije Stanki to Keggun	3	1·99
„ Keggun to Fischwehr Gladki	26½	4·17
„ Fischwehr Gladki to Maruschka	6½	2·00
„ Maruschka to Riga	12	0·34
Total	558	58·93

NOTE.—The distances are given in versts and the falls in fathoms. A verst is practically two-thirds of an English mile.

The depth of the Duna between Witebsk and Riga varies, but nowhere does it exceed 3 fathoms, and that at three points only, viz., between Druja and Kreslawl, near Menkenhof and at Tichaja Ruba, the average being less than a fathom. On the sandbanks and rapids, of which there are 66, covering a total length of 93 versts, the depths, taken from the official surveys, are given below:—

RUSSIA.

No. 1	Distance from Witebak.	Length of Sandbank or Rapid.	Name or Position of Sandbank or Rapid.	Depth.
	Versts. 10—11	Versts. 1		Fathoms.
			Sandbank Shest below Poroshki	
" 2	12—13	1	Babki Rapid	0·32
" 3	24—25	1	Sandbank near the mouth of	
" 4	53—55	2	the Gorodischtsche	0·21
" 5	58—59	1	Below Dajagilewo	0·39
" 6	63—64	1	Wjaschtschizki Sandbank	0·34
" 7	78—74	1	Near Chrapowischtsche	0·34
" 8	74—75	1	" Beschenkowitschi.. ..	0·34
" 9	90—94	4	Below Bui	0·24
" 10	97—100	8	Werba Sandbank	0·33
" 11	101—102	1	Sandbank near Ulla	0·24
" 12	125—126	1	Ilowka Sandbank	0·37
" 13	130—131	1	Golodni Sandbank	0·30
" 14	133—134	1	Below the mouth of the Sosniza	0·34
" 15	142—143	1	Near Pirutino	0·29
" 16	148—149	1	" Rasimirowka	0·29
" 17	168—170	2	" Polotek	0·32
" 18	181—182	1	Ochotniza Sandbank	0·39
" 19	201—202	1	Below the mouth of the Ilowo	0·32
" 20	202—203	1	Near Disna	0·18
" 21	238—239	1	" Kii Island.. ..	0·33
" 22	244—245	1	" Chorober Island	0·33
" 23	310—311	1	Below the mouth of the Wjatka	0·30
" 24	327—330	3	" Bernard Island	0·32
" 25	342—344	2	Krizez Rapid	0·39
" 26	345—348	3	Sandbank near Dwinsk (Düna-	
" 27	380—381	1	burg)	0·21
" 28	397—398	1	Below Wjasowka Krug	0·15
" 29	400—403	3	" the mouth of the Lixna.. ..	0·24
" 30	410—411	1	" Simon Island	0·36
" 31	417—418	1	Dubki Rapid	0·29
" 32	418—419	1	Klaukau Rapid	0·34
" 33	419—420	1	Glinowez Rapid	0·26
" 34	420—421	1	Sedlowatik Rapid	0·35
" 35	431—432	1	Kosaja Rapid	0·25
" 36	432—433	1	Petschina Rapid	0·37
" 37	435—437	2	Katucha Bank	0·37
" 38	438—439	1	Popuski Rapid	0·21
" 39	440—441	1	Tichaja Ruba Rapid	0·21
" 40	443—445	2	Brodesch Rapid	0·07
" 41	446—447	1	Pokrowaja Rapid	0·37
" 42	450—451	1	Pod Ulan Rapid	0·20
" 43	453—454	1	Sibutschije Plesy Rapid	0·22
" 44	455—456	1	Husar Rapid	0·20
" 45	458—460	2	Tschertowa Boroda Rapid	0·35
" 46	461—463	2	Melniza Rapidj	0·32
" 47	475—476	1	Pereseja Bar	0·32
" 48	477—478	1	Pereseja Rapid	0·27
" 49	483—487	4	Below Pereseja Rapid	0·21
" 50	489—490	1	Schelesniza Rapid	0·32
			Tschubes Rapid	0·34
			Near Friedrichstadt	0·27
			Palka Rapid	0·28

	Distance from Witebak.	Length of Sandbank or Rapid.	Name or Position of Sandbank or Rapid.	Depth.
	Versts.	Versts.		Fathoms.
No. 51	496—497	1	Koshemjalskaja Ruba Rapid ..	0·27
„ 52	506—507	1	Near Ringmundshof Holm ..	0·35
„ 53	511—512	1	Krasniye Stanki Rapid ..	0·23
„ 54	512—514	2	Keggum Rapid ..	0·07
„ 55	516—518	2	Banja Rapid ..	0·21
„ 56	518—519	1	Swjatucha Rapid ..	0·36
„ 57	520—521	1	Near Pröbstingshof ..	0·36
„ 58	523—524	1	Slankain Rapid ..	0·36
„ 59	527—528	1	Near first Uexküll Island ..	0·28
„ 60	530—531	1	„ second Uexküll Island ..	0·34
„ 61	539—540	1	Gladki Rapid ..	0·33
„ 62	540—542	2	Near Martinsholm ..	0·37
„ 63	542—543	1	„ the upper end of Nopen- holm ..	0·15
„ 64	543—546	3	Bolwanzi Rapid ..	0·16
„ 65	546—547	1	Near Fischwehr Gladki..	0·37
„ 66	547—549	2	F. cherep Rapid ..	0·26

Passing into the Ulla, which rises in Lake Lepel, stony shallows are met with at Martinowo, Frolkowiz, and Tschaschniki, and near the last-named place there is a short canal, called the Tschaschniki Canal, which cuts off a bend of the river. Continuing along the Ulla we reach Lake Lepel. From Lepel the course runs along the Essa, through the Wereb Canal to Lake Bereschta, then on by another canal connecting this lake with Lake Plawio, through Lake Manetz, down the River Sergutsch and the Sergutsch Canal to the Berezina, this river being entered at a point near the village of Salassy. From Ulla to Salassy the distance is about 80 miles, and the highest water level is in Lakes Plawio and Manetz. From Plawio to Tschaschniki there is a fall of 124 feet, but from Plawio to Salassy the fall is not more than 21 feet, the Berezina, at the point of entrance, being 103 feet higher than the Ulla at Tschaschniki. Between Tschaschniki and Lake Plawio there are nine locks and between Plawio and Salassy three. For ordinary service, *i.e.*, for timber rafts and light craft, there is always plenty of water, even in the driest seasons, but it is questionable whether the supply from the lakes and streams would be sufficient for the projected service.

The Berezina which rises some 40 or 50 miles above Salassy, passes the towns of Borisow and Bobruisk, and falls into the Dnieper at Gorval. It is shallow throughout, and only serviceable for small vessels. Between Borisow and Gorval there is

communication by passenger steamers drawing about $2\frac{1}{2}$ feet of water.

Between Gorval and Ekaterinoslav the Dnieper has no serious obstructions beyond the shoals and sandbanks, but as these are constantly changing, navigation in many places is at times somewhat difficult. After the subsidence of the spring floods fresh channels have always to be marked out, and even then the grounding of the light river boats is of frequent occurrence. Between Gorval and Kiew the navigable depth in summer is about 3 feet, and between Kiew and Kremenschug 3 feet 6 inches. Below Kremenschug the river deepens and continues without a break as far as Ekaterinoslav.

A little below Ekaterinoslav are the cataracts of the Dnieper, and with reference to these Sir Charles Hartley made some remarks in a paper on "Inland Navigations in Europe," published 15 years ago, which I cannot do better than quote. Sir Charles said:—

"This great obstruction to the navigation, which I inspected in 1873, is caused by a granite outshoot of the Carpathians, and consists of nine distinct rapids in a length of 47 miles, the total fall being 107 feet. The most formidable of these obstacles are the Koidatsky Nenasitelsky—the insatiable—and Volingsky Rapids, their average length being only 7,700 feet, with a total fall of 34 feet. Several abortive attempts were made between 1788 and 1833 to improve the navigation by means of side-cuttings near the shore line, but no improvement of any kind was effected till 1853, when, after 10 years' work, a series of canals were formed in the bed of the river, and protected at the sides by parallel walls of rock-work, furnished with splayed guiding-walls facing up-stream, with the view of allowing vessels of small draught to make use of them at certain seasons of the year, when the rapids would otherwise be impassable. In practice, however, their only use has been to allow of the occasional passage of undecked flat-bottomed barges carrying from 5 to 7 tons, and drawing 18 inches at extreme low water. At all other seasons the confined artificial channels, which have a width of about 140 feet, are regarded as mere traps at each one of the rapids, and are therefore, always carefully avoided by descending vessels. No cargo-boats ever ascend the rapids, and the whole trade over them is consequently limited to rafts of timber, and to raw and also manufactured produce floated down-stream from long distances in lightly constructed barges, which are broken up and the wood used for building purposes on their arrival at Kherson, a port on the right bank at the head of the Delta, 216 miles below Alexandrovsk."

From Alexandrovsk, a town at the foot of the cataracts, as far as Nicopol, a distance of about 45 miles, the river is shallow and dangerous to navigation, on account of the rocky nature of its bed. This part of the river is navigable for vessels drawing about 4 feet of water—in dry seasons somewhat less. Below Nicopol the depth gradually increases, but is broken by rocky banks at one

or two points before reaching Kachovka. From Kachovka to Kherson, and below Kherson to the mouth of the river, there is plenty of water even for ships of deep draught. At the mouth of the river and for some distance along the estuary the water is shallow, then it deepens again as far as the Otchakov bar, on which there is 20 feet, but nowhere in the estuary eastward of the bar, with the exception of a slight depression off Stanislaw spit, is there a greater depth than 23 feet. Westward of Otchakov bar the channel to the Black Sea is deep enough for vessels of any size.

The following are the distances from point to point:—

						Distance (about).
						Miles.
Riga to Ulla	..	..	..	..	..	311
Ulla to Salassy	..	..	..	..	..	80
Salassy to Gorval	..	..	..	..	..	178
Gorval to Kiew	..	..	..	..	..	200
Kiew to Krementschug	..	..	..	..	..	212
Krementschug to Ekaterinoslav	..	..	..	..	..	103
Ekaterinoslav to Alexandrovsk	..	..	..	..	..	60
Alexandrovsk to Kherson	..	..	..	..	..	216
Kherson to Otchakov	..	..	..	..	..	50
Total	..	..	..	..	..	1,410

Another route, or rather a slight deviation from the one described above, which has lately been surveyed with the idea of connecting the Duna with the Dnieper by the Lutscheza, perhaps presents fewer difficulties at the point of connection than by the Berezhina, but the main obstacles remain the same. The first part of this route from Riga to Witebsk has been fully described. At Witebsk, about 61 miles above Ulla, the Lutscheza falls into the Duna. This river is small and shallow, but it is believed that it might be rendered navigable without much difficulty. About 46 miles from its mouth a canal 12 miles long would have to be cut to the river Orschiza, and then on by the bed of the Orschiza to the Dnieper, a further stretch of 18 miles or thereabouts. The total length of this connection would be a little over 78 miles and it would have to be locked at two or three places. From the mouth of the Orschiza, 9 miles above the town of Orscha, down as far as Gorval, the character of the Dnieper is pretty nearly the same as between Gorval and Kiew. The remainder of the course to the Black Sea has been given.

Distances by this route:—

	Distance (about).
	Miles.
Riga to Witebsk.. .. .	372
Witebsk to the mouth of the Orschiza	78
Mouth of the Orschiza to Gorval	207
Gorval to Otchakov	841
Total	1,498

From the foregoing it will be seen what physical difficulties would have to be overcome in driving a canal 28 feet in depth from the Baltic to the Black Sea. But this is not all. Supposing the canal to be cut, what is to be done to prevent its silting up? The winters in Russia are long—another consideration—and every year there are heavy accumulations of snow; consequently on the approach of spring large districts are inundated, the result of which is that great quantities of sand and mud are carried down and deposited in the beds of the rivers. As an instance of this, after the breaking up of this last winter, the Duna at Witebsk rose $25\frac{1}{2}$ feet above its normal level, and the bar at the mouth of the river silted up from 22 feet to 13 feet 6 inches in the course of a few days.

But if, after all, it should be found practicable to make such a canal and its silting-up provided against, would the revenue cover the interest on the capital and the annual expenditure for maintenance? This is a question of roubles and copecs. It is not known what the cost of construction would be. A talk of 200,000,000 r. or 600,000,000 fr. is, in my opinion, wide of the mark, and any proposal to undertake the work for either of these sums would need careful consideration.

But leaving aside the question of a deep-water canal, a through waterway for vessels drawing 4 or 5 feet, or perhaps a little more, the cost of making, which would be comparatively small, would undoubtedly be of great service to a large section of the country. As it is, the Duna and the Dnieper are practically useless, except for local carrying purposes. It is true that the upper reaches of the Dnieper have been partially dredged, but the Duna and the Berezina connections have been entirely neglected. Nothing either has been done with regard to the cataracts of the Dnieper. Some months ago a British company endeavoured to secure a concession for locking the cataracts with a view to rendering the channel navigable. They proposed to do the work on the condition that the Imperial Government guaranteed them a dividend of 3 per cent. The Crown was to take all the river dues, and the profits of the company were to be derived from the power of the falls, said to be no less than 300,000 horse-power, but the scheme fell through.

On the lower Dnieper dredging operations have been going on for some time but with quite another object. The channel on the bar at the mouth of the river has been deepened to 16 feet—it

was previously not more than 10 feet deep—and it is intended to dredge down to 22 feet, in order to open out the Dnieper to the sea and make Kherson a port for ocean-going steamers. For this work the sums assigned total up to 1,650,000 r. for the past four years, and 427,000 r. have been granted for 1900.

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